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Gowling Lafleur Henderson LLP
160 Elgin Street
Suite 2600
Ottawa, ON K1P 1C3
CANADA

EXAMINER	
BELLO, AGUSTIN	

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/893,493
Filing Date: June 29, 2001
Appellant(s): GRAVES ET AL.

MAILED
JAN 2 2 2008
GROUP 2800

Xiang Lu
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 11/06/07 appealing from the Office action mailed 02/22/07.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

US 6714545 B1	Hugenberg; Keith F. et al.	03-2004
US 6583901 B1	Hung; Henry	06-2003

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-6, 8-20, and 22-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hugenberg (U.S. Patent No. 6,714,545) in view of Hung (U.S. Patent No. 6,583,901).

Regarding claims 1, 16-20, 22-23, Hugenberg teaches a plurality of access multiplexers (reference numeral 28 in Figure 2), each access multiplexer operable to provide multiplexing of data packets from a plurality of end-users onto a wavelength according to a DWDM plan (column 7 lines 38-41); a photonic switch (reference numeral 40 in Figure 2), coupled to the access multiplexers via fiber optic cable (reference numeral 38 in Figure 2) for carrying the wavelengths, being all-optical (i.e. the input and output of the element 40 in Figure 2 are optical fiber) and operable to switch the wavelengths into dense wavelength division multiplexed (DWDM) signal for transmission (column 7 lines 38-41); and a core node (reference numeral 14 in Figure 2), coupled to the photonic switch (reference numeral 40 in Figure 2) via a fiber optic cable (reference numeral 24 in Figure 2) for carrying the DWDM signal, and operable to route the data packets within the communications network or out to a long haul network. Hugenberg differs from the claimed invention in that Hugenberg fails to specifically teach what the applicant

refers to as an S-DWDM wavelength having an optical precision capable of being interleaved into the optical frequency constraints of a dense wavelength division multiplex wavelength plan used in the core network. However, Hung, in the same field of optical communication systems, teaches that providing a wavelength having an optical precision capable of being interleaved into the optical frequency constraints of a dense wavelength division multiplex wavelength plan used in the core network is well known in the art (see Figures 20-23, column 7 line 64 – column 8 line 2, column 9 lines 2-6, column 17 lines 45-49, 55-56). One skilled in the art would have been motivated to employ a wavelength having an optical precision capable of being interleaved into the optical frequency constraints of a dense wavelength division multiplex wavelength plan used in the core network in the device of Hugenberg in order to avoid exhausting the bandwidth of the fiber (column 2 lines 47-50 of Hung). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to employ a wavelength having an optical precision capable of being interleaved into the optical frequency constraints of a dense wavelength division multiplex wavelength plan used in the core network as taught by Hung in the device of Hugenberg.

Regarding claims 2, 4, the combination of Hugenberg and Hung teaches that the photonic switch includes a multiwavelength source (reference numeral 1362 in Figure 2 of Hung) for generating DWDM quality wavelengths for supplying the access multiplexers with unmodulated wavelengths upon which to multiplex data packets.

Regarding claims 3, 24, Hugenberg teaches that the core node includes a photonic switch and a packet switch (reference numeral 32 in Figure 2).

Regarding claim 5, Hugenberg teaches that the data packets are Ethernet packets (e.g. Ethernet throughout and as evidenced by Ethernet switch reference numeral 42 in Figure 2).

Regarding claim 6, Hugenberg teaches that a portion of the data packets are transmitted from a particular end-user to a particular access multiplexer over a local loop, connecting the particular end-user to the particular access multiplexer, using a digital subscriber line DSL protocol (column 3 lines 32-33).

Regarding claim 7, Hugenberg teaches that the type of DSL is VDSL (column 3 lines 32-33).

Regarding claims 8, 9, the photonic switches and core node of Hugenberg are clearly capable of switching at the wavelength, group of wavelength, and fiber level.

Regarding claim 10, the core node of Hugenberg is clearly capable of switching data packets based on a service to which the data packet pertains.

Regarding claim 11, Hugenberg teaches a plurality of photonic switches, each of the photonic switches connected to at least one other photonic switch and the core node (inherent in a larger overall system of Hugenberg).

Regarding claim 12, Hugenberg teaches a plurality of core nodes, each of core nodes connected to at least one other core node (inherent in a larger overall system of Hugenberg).

Regarding claims 13-15, 25 the combination of Hugenberg and Hung differs from the claimed invention in that it fails to specifically teach that the core node includes a wavelength converter for converting one wavelength to another wavelength to provide an end-to-end photonic connection across the network. However, the use of wavelength converters in optical communication networks is well known in the art. One skilled in the art would have been

motivated to employ wavelength converters in order to allow interconnections between networks. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to employ wavelength converts in the combination of Hugenberg and Hung.

Regarding claim 21, Hugenberg differs from the claimed invention in that Hugenberg fails to specifically teach that N is 40 and s is 5. However, being that the system taught by Hugenberg complies with DWDM standards, it is clear that one skilled in the art could have selected any number of channels and an associated channel spacing including a configuration of 40 channels with a spacing of 5.

Regarding claim 26, Hugenberg teaches that the photonic switch (reference numeral 40 in Figure 2) includes a first plurality of input ports and a second plurality of output ports, with the first being greater than the second, whereby the photonic switch effects concentration of the wavelengths from the access multiplexers (as seen in Figure 2).

(10) Response to Argument

At the outset, the examiner notes that the rejection of the claimed invention is based on a combination of references, i.e. Hugenberg and Hung. However, Appellant's arguments are directed to what each reference teaches individually without considering what the combination of references may have taught or suggested to one skilled in the art. In response to applicant's arguments against the references individually, the examiner notes that it has been judicially determined that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Turning to Appellant's arguments, Appellant raises three major points of contention between what the cited prior art discloses and what the Appellant claims. First, Appellant argues that Hugenberg fails to specifically teach an access multiplexer that multiplexes a plurality of data packets from a plurality of end users onto a sparse dense wavelength division multiplexed (S-DWDM) wavelength as claimed. Second, Appellant argues that Hugenberg's disclosure of a photonic switch is not sufficient to meet Appellant's disclosure of a photonic switch. Third, Appellant argues that Hung's disclosure of generating an optical signal with such high precision that it can be used within the optical frequency constraints of a dense wavelength division multiplex wavelength plan fails to meet Appellant's claim to the generation of a sparse-dense wavelength division multiplexing (S-DWDM) signal. On each of these points the examiner disagrees with Appellant as explained in detail below.

Access Multiplexer

Regarding Appellant's assertion that Hugenburg fails to specifically teach an access multiplexer as claimed, the examiner first notes that at no time does the office action contend that Hugenberg's access multiplexer multiplexes a plurality of data packets from a plurality of end users onto what the Appellant refers to as a sparse dense wavelength division multiplexed (S-DWDM) wavelength. Rather, the examiner has relied on Hugenberg solely for the disclosure of a plurality of access multiplexers (reference numeral 28 in Figure 2; column 4 lines 40-44 indicating a plurality of USAM) that multiplex data packets (Ethernet and ATM throughout Hugenberg being known packet based communications) from a plurality of end users (reference numeral 22 in Figure 2) onto a wavelength that meets the constraints of a DWDM wavelength plan (column 7 lines 38-41). Furthermore, the examiner clearly notes in the office action that

Hugenberg fails to teach Appellant's claimed sparse-dense wavelength division multiplexing (S-DWDM) signal and turns to the disclosure of Hung to meet this limitation. Therefore, Appellant's argument that Hugenberg fails to specifically teach the limitation that "each access multiplexer operable to provide multiplexing of data packets from a plurality of end-users onto a sparse dense wavelength division multiplexed (S-DWDM) wavelength" is essentially a moot point being the examiner never advanced this rationale in formulating the rejection of the claimed invention.

Moreover, Appellant's suggestion that somehow Hugenberg's disclosure of two way data services over high-speed fiber optics using dense wavelength division multiplexing (DWDM) detracts from the examiner's conclusion that the wavelengths used in Hugenberg's network at least have the ability to meet the wavelength constraints necessary in a DWDM wavelength plan is preposterous. The fact remains that Hugenberg clearly discloses support for DWDM and in doing also provides support for all the requirements necessary to form a DWDM signal, namely tight optical frequency constraints.

Photonic Switch

Appellant next argues that Hugenberg fails to specifically teach a photonic switch as claimed. Notably, Appellant has based most of the arguments presented on what is disclosed in Appellant's specification. Naturally, the claims are not nearly as specific as the disclosure of the specification. For example, the claims fail to recite that "the entire traverse from access to core is in the optical domain" as argued, or that the photonic switch is "a non-blocking switch architecture capable of switching any optical input port to any optical output port." However, it has been judicially determined that although the claims are interpreted in light of the

specification, limitations from the specification are not read into the claims. *See In re Van Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).* Therefore, Appellant's arguments which site the specification in an attempt to further define how the claimed photonic switch is distinguished from Hugenberg's photonic switch should not and have not been read into the claims.

The Appellant further substantiates the arguments presented by concluding that the Hugenberg's reference numeral 40 on which the examiner relies to meet the limitation in question must be an electrical device since it provides a mapping function. The applicant makes this conclusion by citing a portion of Hugenberg that fails to provide even a hint of definitive proof that the Hugenberg's photonic switch is anything other than, as examiner contends, a photonic switch. In fact, the mapping functionality the Appellant insists classifies Hugenberg's device as an electrical device can occur in either the optical domain or the electrical domain. For example, Appellant's own specification provides proof that mapping can and does occur in the optical domain (page 20 line 28 - page 21 line 6). Therefore, Appellant's conclusion that Hugenberg's switch must be an electrical switch based on Hugenberg's disclosure of a switch with a mapping function is made in error.

Regardless of what Appellant concludes a mapping function says about the type of switch used in Hugenberg, what is undeniable in Hugenberg is that optical signals are received by the router/aggregation/switching element 40 in Figure 2 via optical fibers, routed, aggregated, then output as optical signals to fibers 24. This occurs without any mention in Hugenberg's specification of an optical-electrical-optical conversion, without any element being shown in the figures that illustrates elements associated with conversion of optical signals to electrical signals

and back, and without a single descriptive label that indicates an O-E-O conversion. In fact, every element associated with Hugenberg's element 40, i.e. input fibers and output fibers, are positively optical elements. As the Board will surely appreciate, it has been judicially determined that when the reference is a utility patent, it does not matter that the feature shown is unintended or unexplained in the specification. The drawings must be evaluated for what they reasonably disclose and suggest to one of ordinary skill in the art. *In re Aslanian, 590 F.2d 911, 200 USPQ 500 (CCPA 1979).* In this case the drawing reasonably discloses and suggests to one of ordinary skill in the art, i.e. the examiner, that Hugenberg's switching element is a photonic switching element.

Moreover, by taking a look at Appellant's specification (page 21 lines 9-18) for a clearer understanding of how the claimed photonic switch actually functions, a number of similarities between the claimed photonic switch and Hugenberg's photonic switch surface. For example, Appellant discloses that the claimed photonic switch consolidates wavelengths into DWDM wavelength spacing for transmission to core nodes or other photonic switches. Likewise, Hugenberg's photonic switch also consolidates wavelengths from subscribers (reference numeral 22 in Figure 2) via router/aggregation device (reference numeral 40 in Figure 2) in to DWDM wavelength spacing (column 7 lines 38-41) for transmission to core nodes (reference numeral 14 in Figure 2) or other photonic switches (reference numerals 32, 46 in Figure 2). Appellant's photonic switch also acts as an access wavelength concentrator in the upstream direction, and acts as an access wavelength expander in the downstream direction. Hugenberg's photonic switch performs in the exact same manner by concentrating wavelengths from access subscribers in the upstream direction, i.e. the plurality of wavelengths from elements 38 and 26 in Figure 2

are concentrated by element 40 onto a single fiber 24 in Figure 2, and by expanding wavelengths in the downstream direction, i.e. the plurality of wavelengths from single fiber 24 in Figure 2 are expanded and output by element 40 onto a plurality of fibers connected to elements 26 and 38 in Figure 2.

Given that Appellant has failed to provide definitive proof that Hugenberg's switch 40 is anything but a photonic switch, that Hugenberg's drawings and specification are silent as to switch 40 being anything other than a photonic switch, that Hugenberg's specification and drawing fail to make a single mention of any O-E-O conversion, that Hugenberg's drawings and specification instead indicate that the inputs to and the outputs from the switch 40 are photonic signals carried on optical fibers, and that according to Appellant own specification that Hugenberg's switch functions in the same manner as the claimed photonic switch, the examiner maintains that Hugenberg's switch element 40 is indeed a photonic switch as claimed by the Appellant.

S-DWDM

Appellant next argues against the examiner's use of Hung to remedy Hugenberg's lack of disclosure of Appellant's claimed sparse-dense wavelength division multiplexed signal (S-DWDM).

First, the examiner notes that the claim language never positively recites, as asserted by Appellant, that interleaving of the S-DWDM signals ever actually takes place. Rather, Appellant claims that the S-DWDM signals need only be ***capable*** of being interleaved into the optical frequency constraints of a dense wavelength division multiplex wavelength plan. According to Appellant, what makes an S-DWDM signal capable of being interleaved into the optical

frequency constraints of a DWDM wavelength plan is an optical wavelength generated with enough optical precision that it can be mapped into the tight frequency constraints of a DWDM network. As noted in the discussion of Hugenberg as prior art, Hugenberg clearly discloses support of a DWDM wavelength plan, but fails to specifically disclose how the wavelengths from the access subscribers are formed or more specifically with what precision they are formed. However, as noted in the office action, Hung (Figures 20-23; column 17 line 31 – column 18 line 10) discloses the creation of optical wavelengths that are formed with such precision that they are easily and reliably mapped and multiplexed into the tight frequency constraints of a DWDM wavelength plan.

Granted, neither Hung nor Hugenberg disclose that the wavelengths are ever actually interleaved but they both disclose that the wavelengths are at least densely multiplexed, thereby suggesting that the wavelengths are of such optical precision that they are easily combined into the optical frequency constraints of DWDM wavelength plan. Furthermore, it bears repeating that the claim simply requires that the wavelengths be ***capable*** of being interleaved into the optical frequency constraints of a DWDM wavelength plan. Interleaving of wavelengths differs from multiplexing of wavelengths in that interleaving interfiles two or more digitized signals by alternating between them while multiplexing is more simplistic in that it only combines the wavelengths into a serial stream without regard to a specific order. However, at the core of Hung's idea of multiplexing signals so that each wavelength falls into the optical frequency constraints of DWDM wavelength plan is precise creation and control of an optical wavelength since the margin of error for overlapping wavelengths and inadvertently creating distortion is much smaller than in a standard wavelength multiplexed plan. In the examiner's opinion, the

wavelengths created by the system of Hung certainly are least ***capable*** of being interleaved into the optical frequency constraints of DWDM wavelength plan since they, like the S-DWDM signals of Appellant, are precisely formed and controlled, and further since they are clearly able to be multiplexed and therefore at least combined into the optical frequency constraints of a DWDM wavelength plan.

The examiner again notes that Appellant has based most of the arguments presented on what is disclosed in Appellant's specification. Naturally, the claims are not nearly as specific as the disclosure of the specification. For example, the claims fail to recite that "S-DWDM ... carrier wavelengths are relatively coarsely spaced," or that the S-DWDM signals have a "carrier frequency spacing of an exact multiple of the DWDM wavelength plan used in the core network," or even "interleaving S-DWDM through a photonic switch." However, it has been judicially determined that although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. *See In re Van Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).* Therefore, Appellant's arguments which site the specification in an attempt to further define how the S-DWDM signals are formed or used should not and have not been read into the claims.

As to Appellant's example scenario where not all wavelengths can be interleaved into a DWDM signal even if they have the required optical precision, the examiner whole-heartedly agrees. Of course it would not make sense try to combine, multiplex, or interleave two signals of the same frequency from two distinct sources onto the same DWDM signal unless complete destruction through interference was the intent of doing so. Hung clearly recognizes this and intentionally uses different wavelengths from each laser which are then shaped and controlled so

that they easily and reliably combine to form the DWDM signal. Furthermore, at no point during the prosecution of the instant application has the examiner or any of the cited prior art advocated for combining signals of the same wavelength onto a single DWDM signal.

Finally, Appellant's argument that Hung actually teaches away from the claimed invention in disclosing that the "system control unit 1360 selects an idle channel to achieve maximum isolation with used channels..." is entirely irrelevant as to whether or not Hung discloses the ability to create an optical signal precise enough so that it is capable of being interleaved into the optical frequency constraints of a DWDM wavelength plan. In fact, the idle channel that Hung discloses is a control channel that is entirely different from the data carrying DWDM channels created by precisely controlled laser sources.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

A. Bello

Agustin Bello

Primary Examiner

JASON CHAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600

KENNETH VANDERPUYE
SUPERVISORY PATENT EXAMINER

Conferees: Jason Chan (SPE); Kenneth Vanderpuye (SPE)

KENNETH VANDERPUYE
SUPERVISORY PATENT EXAMINER